REMARKS

The allowance of claim 26 is gratefully acknowledged.

Claims 1-23 and 25-26 are pending in the present application, of which claim 26 has been allowed. Applicants reserve the right to pursue the original claims and other claims in this application and in other applications.

Claims 1-23 and 25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Jacot et al., U.S. Patent No. 4,848,525 (hereinafter "Jacot") in view of Sandercock, U.S. Patent No. 5,000,415. The rejection is traversed and reconsideration is respectfully requested.

Claim 1 recites a low-frequency vibration control system. According to claim 1, the system includes "a digital control system for causing a force-linearized flux to be generated in a gap between said armature and said magnetic coil." As noted in Applicants' prior amendment, Jacot and Sandercock, even when considered in combination fail to teach or suggest "causing a force-linearized flux to be generated" in a gap between an armature and a magnetic coil. As such, the cited combination fails to teach or suggest the claimed digital control system.

The Office Action has re-applied this rejection stating that it "is unclear how applicant's invention can generate a 'force-linearized flux' and the invention of Jacot et al. does not." Applicants hereby provide the technical reasons why Jacot should not be combined with Sandercock and why, most importantly, even if the references were somehow combined, the cited combination fails to teach or suggest "a digital control system for causing a force-linearized flux to be generated in a gap between said armature and said magnetic coil."

The present application relates to an electromagnetic active vibration control system and electromagnetic actuator. The Jacot reference relates to "a plurality of linear actuators pivotally connected between [an] aft body and [a] mounting member. The magnetic actuators support the forward body relative to the mounting member by magnetically supporting the armatures between paired stator cores in each stator." Jacot Abstract (emphasis added). Sandercock relates to a "piezoelectric displacement transducer, and means for linearizing the voltage-displacement characteristic of the piezoelectric displacement transducer with the first and second feedback signals." Sandercock Col. 3, ll. 26-37 (emphasis added). Neither reference, however, teaches or suggests the "force-linearized flux" of the present invention.

Applicants respectfully submit that the claimed invention's structure and that of the purported combined structure are very different. The structures are different because Jacot and Sandercock's isolation devices permit one structure to move relative to another in such a way that vibration is not transmitted from one structure to the other. In Jacot's device, this relative motion is accommodated by the actuator gap. In Sandercock's device, the relative motion is accommodated by a displacement transducer.

The claimed invention, on the other hand, specifically sets out to avoid isolating its structure from the source of unwanted vibration. The constraints of operating the structure in its required (manufacturing) manner require that the source of unwanted vibration must always remain strongly coupled to the structure. The claimed invention seeks to inject extra vibration into the structure at a third point, via a magnetic flux. This flux is controlled to produce, in a very accurate manner, the non-zero dynamic forces that are required to achieve this objective.

Thus, a structure (i.e., claimed invention) which must remain strongly coupled to the primary source of vibration, and into which an actuator injects extra vibration forces, cannot be equated to a structure (i.e., cited combination) that is designed to be physically decoupled from the source of vibration, and which uses the actuator to accommodate the decoupling process.

Moreover, Jacot makes extensively clear that its isolator is using an armature located between two poles. This geometry is a well-known method of automatically producing a linear force actuator. So it is not necessary to introduce additional techniques for linearization. But when using a single-sided pole and armature, it is essential to introduce a separate force-linearizing process, if the actuator is to generate accurately the required output forces.

In addition, the purpose of the Jacot and Sandercock systems is to introduce an isolator(s) between the source of vibration and the receiver, and the objective of the magnetic actuator is to reproduce as little dynamic vibration force output as possible. Examples of passive isolators are rubber mounts, air mounts, or damped metal springs. They are conventionally introduced into the transmission path between the source of vibration and the load. Such isolators can also be constructed using active elements. Sandercock proposes that the active element is a piezoelectric element which expands or contracts under applied electric voltage. Jacot uses essentially two types of active elements in series. A long stroke linear actuator to accommodate the large low-frequency motions, and a short stroke electromagnetic actuator to accommodate the higher frequency motions. These two types of actuators are connected together in series via an intermediate stage, but the essential feature remains, namely that they are mounted into the transmission path between the source of vibration and the supported load.

The claimed invention, on the other hand, does not attempt to introduce an isolating actuator between these two components. The actuator is introduced at a third, entirely separate point, so that the combined effect of the original source of vibration and the actuator-injected vibration minimizes the response at the receiver. To achieve this objective, the actuator must generate significant dynamic force outputs - the invention would not work if the actuator force output was always seeking to be as small as possible.

Applicants respectfully submit that the cited combination fails to disclose, teach or suggest the claimed invention. Accordingly, Applicants respectfully submit that claim 1 is allowable over the cited combination. Claims 2 and 3 each depend from claim 1 and are allowable along with claim 1 for at least the reasons set forth above and on their own merits. Claims 4-22 also include limitations relating to "a force-linearized flux." Therefore, for at least reasons given above with respect to claim 1, claims 4-22 are allowable over the cited combination. Claims 23 and 25 recite similar limitations as claim 1 and are allowable for at least reasons given above and on their own merits.

The rejection should be withdrawn and claims 1-23 and 25 allowed.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

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Respectfully submitted,

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